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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/852,781	05/11/2001	David M. Butler	208485US8	5201

22850 7590 05/20/2004

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EXAMINER	
PHAM, KHANH B	
ART UNIT	**PAPER NUMBER**
2177	

DATE MAILED: 05/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PPG

Office Action Summary	Application No.	Applicant(s)
	09/852,781	BUTLER, DAVID M.
	Examiner	**Art Unit**
	Khanh B. Pham	2177

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 May 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-90* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-90* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 May 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Preliminary Amendment

1. The preliminary amendment filed on April 23, 2002 has been entered. The specification has been amended.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: reference sign **90** mentioned at page 13 line 17. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-90 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

- The language of the claim raises a question as to whether the claims is directed merely to an abstract idea that is not tied to a technological art, environment or machine which would result in a practical application producing a concrete, useful, and tangible result to form the basis of statutory subject matter under 35 U.S.C. 101.

- Regarding claims 1-21 and 43-66, it is unclear from the claim language whether the method is being accomplished by a computer or whether it is merely data on a computer being represented, e.g., on a piece of paper as in the drawing figures of the instant application.
- Regarding claims 22-42 and 67-90, data model are abstract ideas. Even if the model is a software model, it is not tangible embodied on a computer readable medium so as to be executable. Claims 22-26, 29, 32, 67-71, 74, 80 also appear to be non-functional descriptive material.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-6, 8, 11, 22-27, 29, 32, 43-48, 50, 56, 67-72, 74, 80 are rejected under 35 U.S.C. 102(e) as being anticipated by Altschuler et al. (US 6,556,983 B1), hereinafter "Altschuler".

As per claims 1, 22, Altschuler teaches a method of representing data on a computer, comprising the steps of:

- "constructing a first table to represent an entity type with a column in the table for a respective attribute of the entity type" at Fig. 47;
- "entering attribute data into rows of the first table" at Fig. 47;
- "constructing a row graph which represents an ordering relationship between the rows of the first table" at Fig. 8;
- "and generating a finite distributive lattice (FDL) from the first table to have distinct combinations of the rows of the first table, wherein two different combinations of members are distinct if they do not represent a same ordering relationship" at Col. 16 lines 40-65 and Fig. 10.

As per claims 2, 23, Altschuler teaches the method according to claims 1, 22, wherein "the first table includes one row for each primary entity of the entity type" at Fig. 47.

As per claims 3, 24, Altschuler teaches the method according to claims 1, 22, wherein "a first entity is included in a second entity if and only if there is a path in the graph from a node corresponding to the first entity to a node corresponding to the second entity" at Col.15 lines 40-65.

As per claims 4, 25, Altschuler teaches the method according to claims 1, 22, wherein "the ordering relationship of the rows of the first table comprises a partially ordered relationship" at Col. 15 lines 50-65.

As per claims 5, 26, Altschuler teaches the method according to claims 1, 22, further comprising the step of: "querying the row graph to determine distinct combinations of the rows of the first table, wherein two different combinations of members are distinct if they do not represent a same ordering relationship" at Col. 17 lines 1-15 .

As per claims 6, 27, Altschuler teaches the method according to claims 1, 22, further comprising the step of: "executing a command indicative of an operation a1<= a2 to determine if and only if there is a path in the graph from a1 to a2, where a1 and a2 are nodes in the row graph" at Col. 16 lines 5-15.

As per claims 8, 29, Altschuler teaches the method according to claims 1, 22, wherein "the attribute data comprises at least one of simulation data, spatial data, object-orientated data, and relational data" at Col. 14 lines 10-25.

As per claims 11, 32, Altschuler teaches the method according to claims 1, 22, wherein "any node in the row graph below and connected to another node is included in the other node" at Fig. 8.

As per claims 43, 67, Altschuler teaches a method of representing data on a computer, comprising the steps of:

- "constructing a first table to represent an entity type with a column in the table for a respective attribute of the entity type" at Fig. 47;
- "entering attribute data into rows of the first table" at Fig. 47;

- "constructing a row graph which represents an ordering relationship between the rows of the first table" at Fig. 8;

- "generating a finite distributive lattice (FDL) from the first table to have distinct combinations of the rows of the first table, wherein two different combinations of members are distinct if they do not represent a same ordering relationship" Col. 16 lines 40-65 and Fig. 10;

- "assigning a column graph which represents an ordering relationship between columns of the first table, the column graph being a row graph from a second table" at Fig. 47 and Fig. 8.

- "interpreting the table, row graph and column graph as a finite sheaf" at Fig. 47 and Fig. 8.

As per claims 44, 68, Altschuler teaches the method according to claims 43, 67, wherein "the first table includes one row for each primary entity of the entity type" at Fig. 47.

As per claims 45, 69, Altschuler teaches the method according to claims 43, 67, wherein "a first entity is included in a second entity if and only if there is a path in the graph from a node corresponding to the first entity to a node corresponding to the second entity" at Col.15 lines 40-65.

As per claims 46, 70, Altschuler teaches the method according to claims 43, 67, wherein "the ordering relationship of the rows of the first table comprises a partially ordered relationship" at Col. 16 lines 60-65.

As per claims 47, 71, Altschuler teaches the method according to claims 43, 67, further comprising the step of: "querying the row graph to determine distinct combinations of the rows of the first table, wherein two different combinations of members are distinct if they do not represent a same ordering relationship" at Fig. 10.

As per claims 48, 72, Altschuler teaches the method according to claims 43, 67, further comprising the step of: "executing a command indicative of an operation a1<= a2 to determine if and only if there is a path in the graph from a1 to a2, where a1 and a2 are nodes in the row graph" at Col. 16 lines 5-15.

As per claims 50, 74, Altschuler teaches the method according to claim 43, 67, wherein "the attribute data comprises at least one of simulation data, spatial data, object-orientated data, and relational data" at "Fig. 47.

As per claims 56, 80, Altschuler teaches the method according to claims 43, 67, wherein "any node in the row graph below and connected to another node is included in the other node" at Fig. 8.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 7, 9-10, 12-21, 28, 30-31, 33-42, 49, 51-55, 57-66, 73, 75-79, 81-90 are rejected under 35 U.S.C. 103(a) as being unpatentable over Altschuler as applied to claims 1-6, 8, 11, 22-27, 29, 32, 43-48, 50, 56, 67-72, 74, 80 above, and in view of Oles ("An application of Lattice Theory to knowledge representation"), hereinafter "Oles"

As per claims 7, 28, Altschuler teaches the method according to claims 1, 22 as discussed above. Altschuler does not explicitly teach "executing a command indicative of an operation DOWN(a) in which a resultant table and graph is returned including all rows of the first table and nodes and links of the row graph which are less than or equal to "a", where "a" is a specified node in the row graph". However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 9, 30, Altschuler teaches the method according to claims 1, 22 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of an operation JOIN(I1, I2, . . . In) to determine a smallest member of the FDL which is greater than or equal to the inputs I1, I2, . . . In. However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4

As per claims 10, 31, Altschuler teaches the method according to claims 1, 22 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of an operation MEET(I1, I2, . . . In) to determine a largest member of the FDL which is less than or equal to the inputs I1, I2, . . . In. However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 12, 33, Altschuler teaches the method according to claims 1, 22 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of the operation n-ary Cartesian product L1xL2x . . . .xLn, to generate a resultant FDL with columns equal to the disjoint union of the columns of L1, L2, . . . Ln, where L1, L2, ... Ln represents any collection of FDLs, wherein the row-graph is any partial order". However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 13, 34, Altschuler teaches the method according to claims 1, 22 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of the operation of SELECTION(L, c) to generate a resultant FDL comprising the table rows that satisfy c, the row graph that satisfy c, and all columns of L, where L is a FDL and c is a condition on the rows of L". However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice

using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 14, 35, Altschuler teaches the method according to claims 1, 22 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of the operation PROJECTION(L, c) to generate a resultant FDL comprising all columns of L that satisfy c, and all table rows and the entire graph L, where L is a FDL and c is a condition on the columns of L". However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 15, 36, Altschuler teaches the method according to claims 1, 22 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of the operation UNION(L1, L2) to generate a resultant FDL containing the rows of L1 and the rows of L2, a row graph which is the reflexive, transitive reduction of the union of the row graphs of L1 and L2, and the columns of L1, where L1 and L2 are FDLs with the same columns". However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles,

section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 16, 37, Altschuler teaches the method according to claims 1, 22 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of the operation INTERSECTION(L1, L2) to generate a resultant FDL containing those rows of L1 which are the same as rows in L2, a row graph which is the reflexive, transitive reduction of the intersection of the row graphs of L1 and L2, and the columns of L1, where L1 and L2 are FDLs with the same columns". However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 17, 38, Altschuler teaches the method according to claims 1, 22 as discussed above. Altschuler does not explicitly teach: "executing a command

indicative of RENAME(L, new_name) to change to name of L new_name, where L is a FDL and new_name is a name". However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 18, 39, Altschuler teaches the method according to claims 1, 22 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of the operator CREATE_JIM(L) to create a new row in the table of L and a new node in the row graph of L, where L is a FDL" . However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 19, 40, Altschuler teaches the method according to claims 1, 22 as discussed above. Altschuler does not explicitly teach: "executing a command

indicative of DELETE_JIM(L, JIM_ID) to remove a row from the table of L and to remove the corresponding node and any connecting links in the row graph of L, where L is a FDL and JIM_ID identifies a row in L" . However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 20, 41, Altschuler teaches the method according to claims 1, 22 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of the operator CREATE_LINK(L, LESSER_ID, GREATER_ID) to create a link between the node corresponding to LESSER_ID and the node corresponding to GREATER_ID in the row graph of L, where L is a FDL and LESSER_ID and GREATER_ID identify the lesser and greater rows, respectively, of the ordering relationship represented by the link". However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for

specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 21, 42, Altschuler teaches the method according to claims 1, 22 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of the operator DELETE_LINK(L, LESSER_ID, GREATER_ID) to remove a link between the node corresponding to LESSER_ID and the node corresponding to GREATER_ID in the row graph of L, where L is a FDL and LESSER_ID and GREATER_ID identify the lesser and greater rows, respectively, of the ordering relationship represented by the link". However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 49, 73, Altschuler teaches the method according to claims 43, 67 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of an operation DOWN(a) in which a resultant table and graph is returned including all rows of the first table and nodes and links of the row graph which are less than or equal to "a", where "a" is a specified node in the row graph". However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice

data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 51, 75, Altschuler teaches the method according to claims 43, 67 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of an operation JOIN(I1, I2,...In) to determine a smallest member of the sheaf which is greater than or equal to the inputs I1, I2, ..., In". However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 52, 76, Altschuler teaches the method according to claims 43, 67 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of an operation MEET(I1, I2,...In) to determine a largest member of the sheaf which is less than or equal to the inputs I1, I2,...In" . However, it is well known in the art

to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 53, 77, Altschuler teaches the method according to claims 43, 67 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of an operation EXP(L) to generate a resultant sheaf with a column graph corresponding to the row graph of L, where L is a sheaf". However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 54, 78, Altschuler teaches the method according to claims 43, 67 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of an operation LOG(L) to determine the schema lattice of the sheaf, where L

is the sheaf". However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 55, 79, Altschuler teaches the method according to claims 43, 67 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of an operation RESTRICT L TO S to determine a projection of the sheaf onto columns in the down set of S, where S is a member of the schema of L and L is the sheaf". However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 57, 81, Altschuler teaches the method according to claims 43, 67 as discussed above. Altschuler does not explicitly teach: "executing a command

indicative of the operation n-ary Cartesian product L1xL2x. . . . .xLn, to generate a resultant sheaf with a schema lattice equal to the union of the schema of L1, L2, . . . Ln, where L1, L2, . . . Ln represents any collection of sheaves". However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 58, 82, Altschuler teaches the method according to claims 43, 67 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of the operation of SELECTION(L, c) to generate a resultant sheaf comprising the table rows that satisfy c, the row graph that satisfy c, and the entire column graph and all columns of L, where L is an sheaf and c is a condition on the rows of L". However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing

computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 59, 83, Altschuler teaches the method according to claims 43, 67 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of the operation PROJECTION(L, c) to generate a resultant sheaf comprising the column graph and columns of L that satisfy c, and all table rows, and the entire row graph of L, where L is a sheaf and c is a condition on the columns of L" . However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 60, 84, Altschuler teaches the method according to claims 43, 67 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of the operation UNION(L1, L2) to generate a resultant sheaf containing the rows of L1 and the rows of L2, a row graph which is the reflexive, transitive reduction of the union of the row graphs of L2 and L2, and the column graph of L1, where L1 and L2 are sheaves with the same column graph". However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary

by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 61, 85, Altschuler teaches the method according to claims 43, 67 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of the operation INTERSECTION(L1, L2) to generate a resultant sheaf containing those rows of L1 which are the same as rows in L2, a row graph which is the reflexive, transitive reduction of the intersection of the row graphs of L1 and L2, and the column graph of L1, where L1 and L2 are sheaves with the same column graph".

As per claims 62, 86, Altschuler teaches the method according to claims 43, 67 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of RENAME(L, new_name) to change to name of L new_name, where L is a sheaf and new_name is a name" . However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and

constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 63, 87, Altschuler teaches the method according to claims 43, 67 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of the operator CREATE_JIM(L) to create a new row in the table of L and a new node in the row graph of L, where L is a sheaf" . However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 64, 88, Altschuler teaches the method according to claims 43, 67 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of DELETE_JIM(L, JIM_ID) to remove a row from the table of L and to remove the corresponding node and any connecting links in the row graph of L, where L is a sheaf and JIM_ID identifies a row in L". However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using

mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 65, 89, Altschuler teaches the method according to claims 43, 67 as discussed above. Altschuler does not explicitly teach:, further comprising the step of: "executing a command indicative of the operator CREATE_LINK(L, LESSER_ID, GREATER_ID) to create a link between the node corresponding to LESSER_ID and the node corresponding to GREATER_ID in the row graph of L, where L is a sheaf and LESSER_ID and GREATER_ID identify the lesser and greater rows, respectively, of the ordering relationship represented by the link". However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

As per claims 66, 90, Altschuler teaches the method according to claims 43, 67 as discussed above. Altschuler does not explicitly teach: "executing a command indicative of the operator DELETE LINK(L, LESSER_ID, GREATER_ID) to remove a link between the node corresponding to LESSER_ID and the node corresponding to GREATER_ID in the row graph of L, where L is a sheaf and LESSER_ID and

GREATER_ID identify the lesser and greater rows, respectively, of the ordering relationship represented by the link". However, it is well known in the art to define a set of algebraic operators to operate on graphs, and lattice data model, as exemplary by Oles, section 2-8. Thus, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made modify Altschuler's teaching to include the algebraic operator in order to enable calculating and manipulating the lattice using mathematical representation, and as noted by Oles, to "provide a general method for specifying and constructing computationally useful representation of arbitrary finite distributive lattices. Such structure are basis in algebra and logic" at page 4.

Conclusion

8. The prior art made of record, listed on form PTO-892, and not relied upon, if any, is considered pertinent to applicant's disclosure.

If a reference indicated as being mailed on PTO-FORM 892 has not been enclosed in this action, please contact Lisa Craney whose telephone number is **(703) 305-9601** for faster service.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh B. Pham whose telephone number is (703) 308-7299. The examiner can normally be reached on Monday through Friday 7:30am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E Breene can be reached on (703) 305-9790. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Khanh B. Pham
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KBP
May 11, 2004

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PRIMARY EXAMINER